WHAT IS CLAIMED IS:

1. A printing system that eventually converts original image data to be printed into dot data as data in unit of dots and prints an
5   image in unit of raster lines as arrays of dots created according to the dot data, said printing system comprising:

a print head that has multiple dot formation elements to create dots on a printing medium;

a print head control module that prints each raster line included
10   in the image by at least two dot formation elements;

an image data conversion module that converts the original image data into converted data, which is in a form prior to expansion into dot data corresponding to the multiple dot formation elements and is in a more compressed form than the dot data;

15   a converted data storage module that stores the converted data;

a data expansion module that successively reads out the stored converted data and expands the converted data into dot data for actuating the multiple dot formation elements; and

an output module that outputs the expanded dot data to said
20   print head control module.

2. A printing system in accordance with claim 1, wherein said image data conversion module converts the original image data into the converted data in a form prior to a halftoning process for conversion
25   into the dot data.

3. A printing system in accordance with claim 2, wherein said data expansion module comprises:

a target pixel setting module that sets a target pixel as an object
30   for specification of a dot on-off state;

a dot on-off state specification module that expands image data

including the target pixel from the converted data stored in said converted data storage module and specifies the dot on-off state in the target pixel based on the expanded image data; and

a module that repeats the specification of the dot on-off state with a successive shift of the target pixel, thereby generating dot data for actuating the multiple dot formation elements.

4. A printing system in accordance with claim 3, wherein said print head repeats forward and backward passes relatively on the printing medium to create dots and thereby form raster lines as arrays of dots,

said data expansion module comprises a specification result accumulation module that temporarily accumulates results of the specification of the dot on-off state in respective target pixels, and

said output module collects results of the specification with regard to dots formed by said print head in at least one forward pass or a backward pass, among the accumulated results of the specification, and outputs the collected results of the specification to said print head control module.

5. A printing system in accordance with claim 3, wherein said dot on-off state specification module expands data corresponding to the target pixel among the stored converted data and thereby specifies the dot on-off state in the target pixel.

6. A printing system in accordance with claim 1, said printing system comprising an image processing device that processes the original image data and a printing device that uses said print head to form an image on the printing medium, where said image processing device and said printing device are separate from each other,

said image data conversion module is incorporated in said image

processing device, and

said converted data storage module, said data expansion module, said output module, and said print head control module, in addition to said print head, are incorporated in said printing device.

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7. A printing system in accordance with claim 6, wherein said image processing device further comprises a data transfer module that transfer the converted data to said printing device,

said printing device further comprises a data reception module

10 that receives the transferred converted data and outputs the converted data to said converted data storage module, and

said data expansion module comprises:

a target pixel setting module that sets a target pixel as an object for specification of a dot on-off state;

15 a dot on-off state specification module that expands image data including the target pixel from the converted data stored in said converted data storage module and specifies the dot on-off state in the target pixel based on the expanded image data; and

a module that repeats the specification of the dot on-off state

20 with a successive shift of the target pixel, thereby generating dot data for actuating the multiple dot formation elements.

8. A printing system in accordance with claim 1, wherein said image data conversion module compresses dot data obtained by

25 halftoning the original image data as the conversion into the converted data.

9. A printing system in accordance with claim 8, wherein said print head control module comprises:

30 a module that repeats forward and backward passes of said print head on the printing medium and actuates plurality of the dot

formation elements apart from each other by a predetermined distance in at least every forward or backward pass, so as to form multiple raster lines; and

a raster position shifting module that shifts a relative position of said print head to the printing medium in a direction crossing the raster lines, so as to fill a gap between a set of raster lines formed previously with another set of raster lines formed later.

10. A printing system in accordance with claim 9, wherein said data expansion module comprises:

a dot data storage module that expands dot data, which include dot data for forming a set of raster lines corresponding to the multiple dot formation elements, from the converted data stored in said converted data storage module, and when dot data for forming a next set of raster lines subsequent to the set of raster lines are expanded, stores the dot data for formation of the next set of raster lines.

11. A printing system in accordance with claim 1, wherein said image data conversion module collects a preset number of multiple pixels in the image into each pixel group and specifies a number of dots to be created in each pixel group based on the image data, so as to obtain the converted data,

said converted data storage module stores data representing the specified number of dots to be created in each pixel group as the converted data, and

said data expansion module converts the stored data representing the specified number of dots into the dot data and comprises a dot data storage module, which simultaneously stores the converted dot data at least once with respect to M pixel sets included in each pixel group, where M is an integer of not less than 2 but of less than N, which is a total number of pixel sets included in the pixel

group.

12. A printing system in accordance with claim 11, wherein said dot data storage module simultaneously stores dot data with respect to at least multiple pixel sets, in which dots are consecutively created in the pixel group, as the dot data with respect to the M pixel sets.

13. A printing system in accordance with claim 12, wherein said dot data storage module simultaneously stores dot data with respect to at least multiple pixel sets, which are left at last in the pixel group, as the dot data with respect to the M pixel sets.

14. A printing system in accordance with claim 11, wherein said dot data storage module converts the number data into the dot data in an order of pixels having potential for dot creation in the pixel group and stores the dot data.

15. A printing device that receives data corresponding to an object image to be printed from outside of the printing device and creates dots on a printing medium, so as to print the object image according to the received data, said printing device comprising:
a print head that has multiple dot formation elements to create dots on the printing medium;
a print head control module that prints each raster line included in the image by at least two dot formation elements;
a converted data storage module that stores converted data, which is obtained by converting the object image in a form prior to expansion into dot data corresponding to the multiple dot formation elements and in a more compressed form than the dot data;
a data expansion module that successively reads out the stored converted data and expands the converted data into dot data for

actuating the multiple dot formation elements; and

an output module that outputs the expanded dot data to said print head control module.

5   16. A printing device in accordance with claim 15, wherein said converted data storage module stores dot data, which is obtained by a halftoning process, in the more compressed form as the converted data.

17. A printing device in accordance with claim 15, wherein said

10   converted data storage module stores data representing a specified number of dots to be created in each pixel group as the converted data, where a preset number of multiple pixels in the image are collected into each pixel group and the number of dots to be created in each pixel group is specified based on the image data, and

15   said data expansion module converts the stored data representing the specified number of dots into the dot data and comprises a dot data storage module, which simultaneously stores the converted dot data at least once with respect to M pixel sets included in each pixel group, where M is an integer of not less than 2 but of less

20   than N, which is a total number of pixel sets included in the pixel group.

18. A printing method that eventually converts original image data to be printed into dot data as data in unit of dots and actuates

25   multiple dot formation elements mounted on a print head according to the dot data, so as to create dots on a printing medium and print an image in unit of raster lines as arrays of dots, said printing method comprising the steps of:

converting the original image data into converted data, which is

30   in a form prior to expansion into dot data corresponding to the multiple dot formation elements and is in a more compressed form than the dot

data;

storing the converted data into a memory;

successively reading out the stored converted data and expanding the converted data into dot data for actuating the multiple

5   dot formation elements;

arranging the expanded dot data to make each raster line included in the image formed by at least two dot formation elements; and

actuating the dot formation elements on the print head, based on

10   the arranged dot data.

19. A printing method in accordance with claim 18, wherein said storing step stores dot data, which is obtained by a halftoning process, in the more compressed form in the memory as the converted data.

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20. A printing method in accordance with claim 18, wherein said storing step stores data representing a specified number of dots to be created in each pixel group in the memory as the converted data, where a preset number of multiple pixels in the image are collected into each

20   pixel group and the number of dots to be created in each pixel group is specified based on the image data, and

said expanding step converts the stored data representing the specified number of dots into the dot data and simultaneously stores the converted dot data at least once with respect to M pixel sets

25   included in each pixel group, where M is an integer of not less than 2 but of less than N, which is a total number of pixel sets included in the pixel group.

21. A printing method that eventually converts original image

30   data to be printed into dot data as data in unit of dots and actuates multiple dot formation elements mounted on a print head according to

the dot data, so as to create dots on a printing medium and print an image in unit of raster lines as arrays of dots, said printing method comprising the steps of:

storing converted data in a memory, where the converted data is obtained by converting the original image data in a form prior to expansion into dot data corresponding to the multiple dot formation elements and in a more compressed form than the dot data;

successively reading out the stored converted data and expanding the converted data into dot data for actuating the multiple dot formation elements;

arranging the expanded dot data to make each raster line included in the image formed by at least two dot formation elements; and

actuating the dot formation elements on the print head, based on the arranged dot data.

22. A printing method in accordance with claim 21, wherein said storing step stores dot data, which is obtained by a halftoning process, in the more compressed form in the memory as the converted data.

23. A printing method in accordance with claim 21, wherein said storing step stores data representing a specified number of dots to be created in each pixel group in the memory as the converted data, where a preset number of multiple pixels in the image are collected into each pixel group and the number of dots to be created in each pixel group is specified based on the image data, and

said expanding step converts the stored data representing the specified number of dots into the dot data and simultaneously stores the converted dot data at least once with respect to M pixel sets included in each pixel group, where M is an integer of not less than 2 but of less than N, which is a total number of pixel sets included in the

pixel group.

24. A program that causes a printing method to be actualized by a computer incorporated in a printing device, said printing method
5   eventually converting original image data to be printed into dot data as data in unit of dots and actuating multiple dot formation elements mounted on a print head according to the dot data, so as to create dots on a printing medium and print an image in unit of raster lines as arrays of dots, said computer incorporated in said printing device
10 attaining the functions of:

storing converted data in a memory, where the converted data is obtained by converting the original image data in a form prior to expansion into dot data corresponding to the multiple dot formation elements and in a more compressed form than the dot data;
15 successively reading out the stored converted data and expanding the converted data into dot data for actuating the multiple dot formation elements;

arranging the expanded dot data to make each raster line included in the image formed by at least two dot formation elements;
20 and

actuating the dot formation elements on the print head, based on the arranged dot data.

25. A program in accordance with claim 24, wherein said storing
25 function stores dot data, which is obtained by a halftoning process, in the more compressed form in the memory as the converted data.

26. A program in accordance with claim 24, wherein said storing function stores data representing a specified number of dots to be
30 created in each pixel group in the memory as the converted data, where a preset number of multiple pixels in the image are collected into each

pixel group and the number of dots to be created in each pixel group is specified based on the image data, and

said expanding function converts the stored data representing the specified number of dots into the dot data and simultaneously stores the converted dot data at least once with respect to M pixel sets included in each pixel group, where M is an integer of not less than 2 but of less than N, which is a total number of pixel sets included in the pixel group.